METHOD, SYSTEM, AND PROGRAM FOR
A SYSTEM ARCHITECTURE FOR AN ARBITRARY NUMBER OF BACKUP COMPONENTS
J. J. Wolfgang et al.
TUC920030107US1
Sheet 1/12

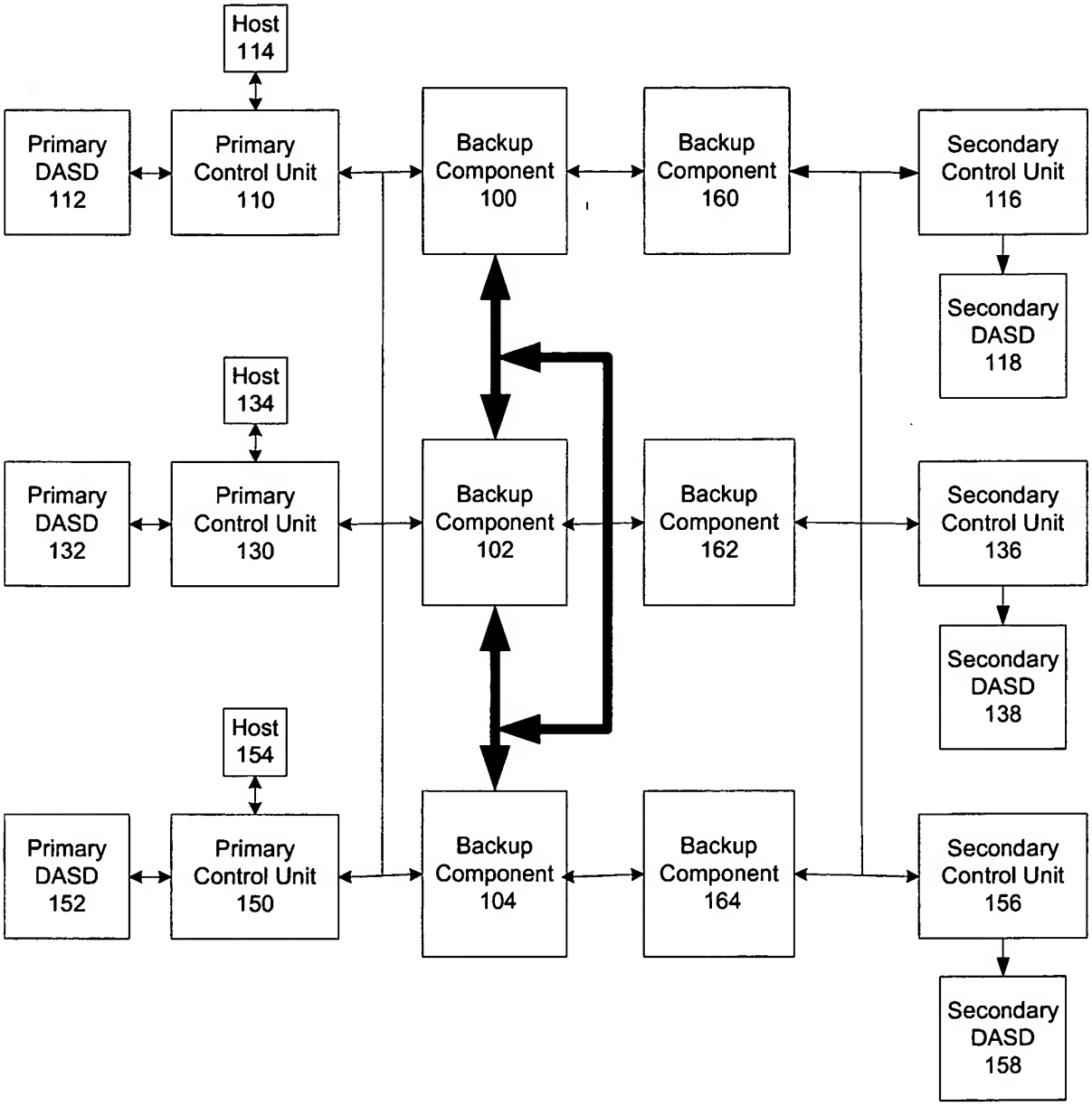

FIG. 1A

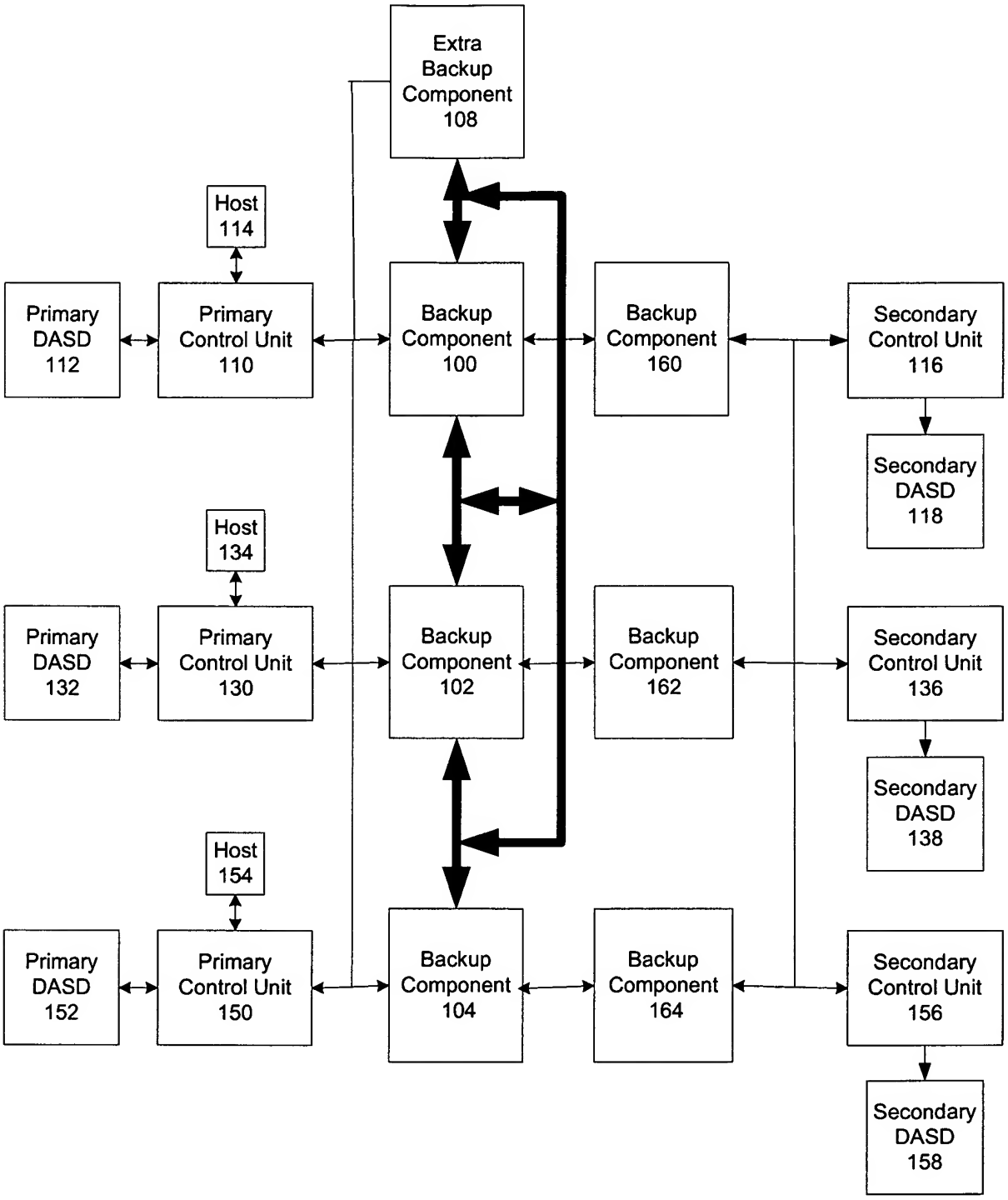
Extra Backup Component 108
Host 114
Primary DASD 112
Primary Control Unit 110
Backup Component 100
Backup Component 160
Secondary Control Unit 116
Secondary DASD 118
Host 134
Primary DASD 132
Primary Control Unit 130
Backup Component 102
Backup Component 162
Secondary Control Unit 136
Secondary DASD 138
Host 154
Primary DASD 152
Primary Control Unit 150
Backup Component 104
Backup Component 164
Secondary Control Unit 156
Secondary DASD 158

FIG. 1B

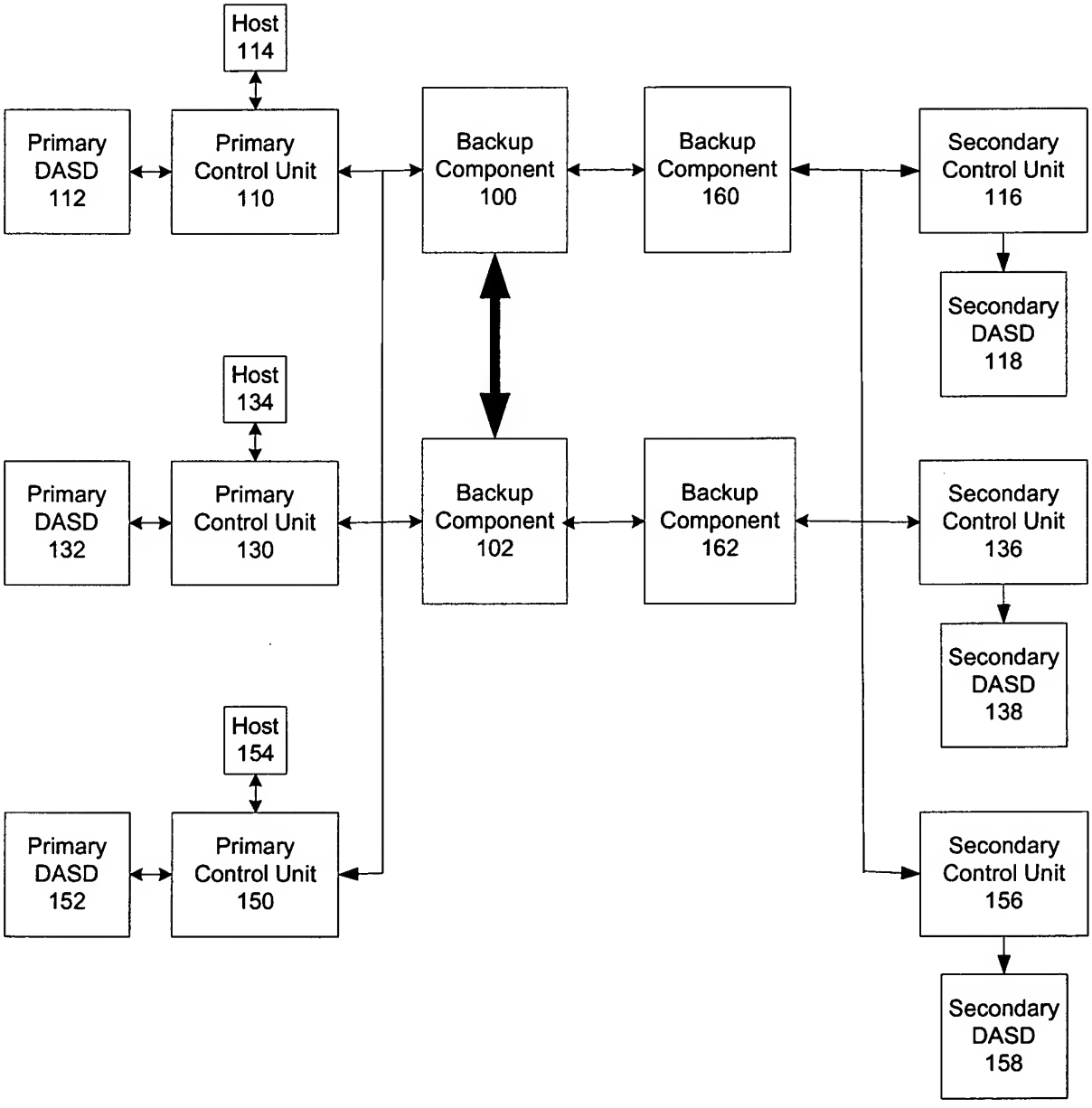
Host
114
Primary
DASD
112
Primary
Control Unit
110
Backup
Component
100
Backup
Component
160
Secondary
Control Unit
116
Secondary
DASD
118
Host
134
Primary
DASD
132
Primary
Control Unit
130
Backup
Component
102
Backup
Component
162
Secondary
Control Unit
136
Secondary
DASD
138
Host
154
Primary
DASD
152
Primary
Control Unit
150
Secondary
Control Unit
156
Secondary
DASD
158

FIG. 1C

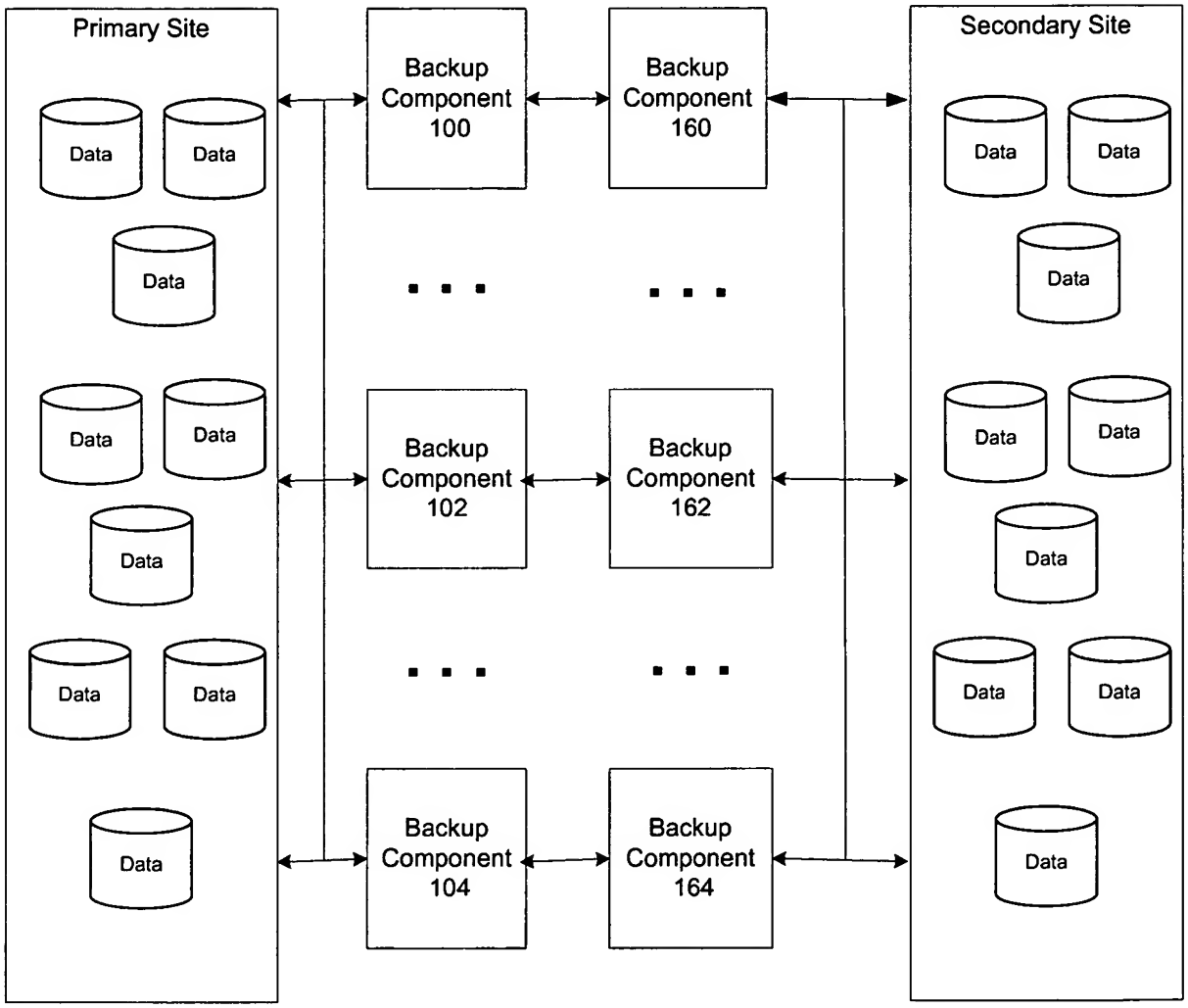
Primary Site
Backup Component 100
Backup Component 160
Secondary Site
Data
Backup Component 102
Backup Component 162
Backup Component 104
Backup Component 164

FIG. 1D

200

Backup Component Identifier	Responsible Volumes

FIG. 2A

210

Data Update	Sequence Identifier	Source Volume Identifier	Target Volume Identifier	Backup component from which Data Updates were mirrored	Backup Component to which Data Updates were mirrored

FIG. 2B

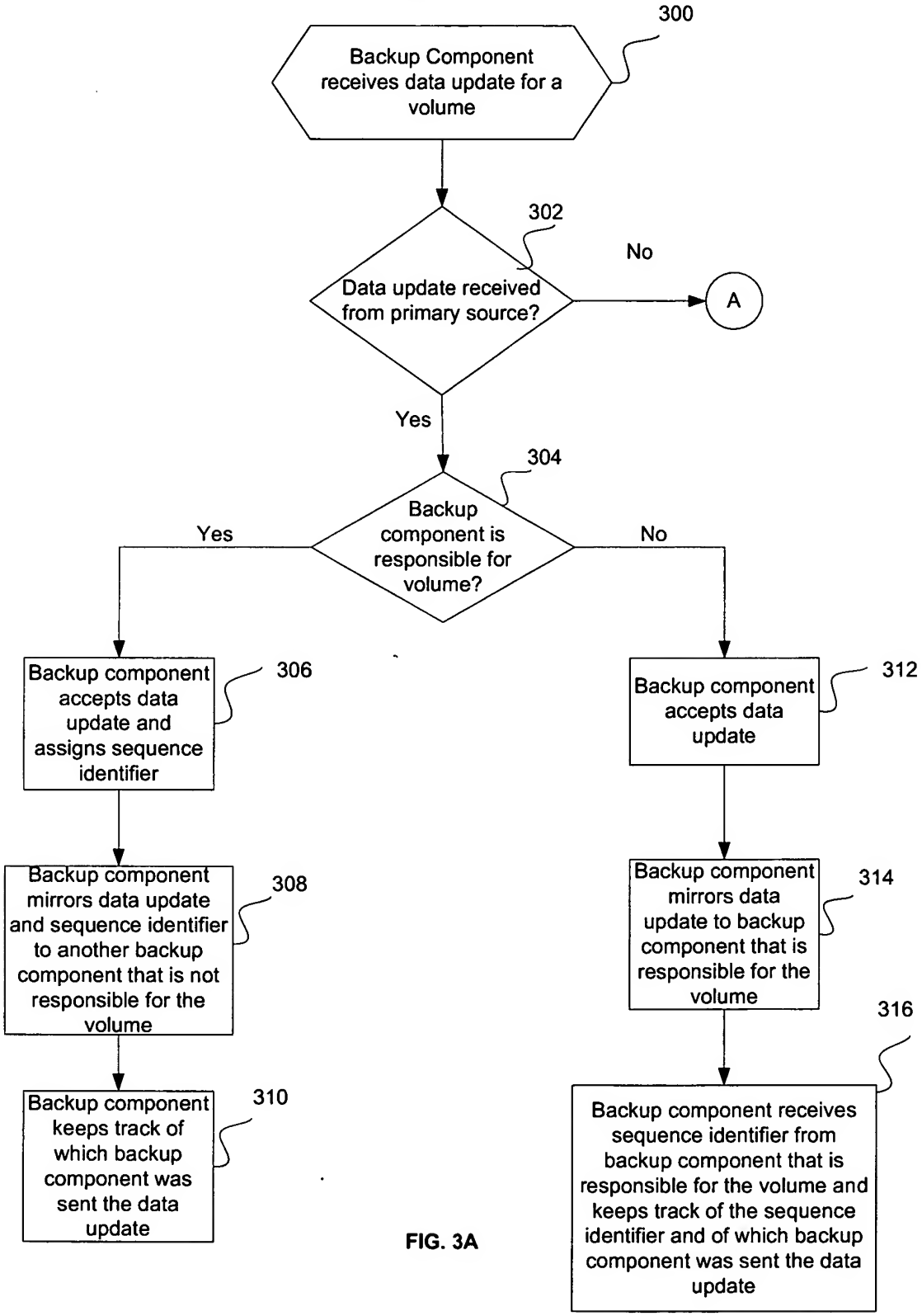
300
Backup Component receives data update for a volume
302
Data update received from primary source?
No
A
Yes
304
Backup component is responsible for volume?
Yes
No
Backup component accepts data update and assigns sequence identifier
306
Backup component mirrors data update and sequence identifier to another backup component that is not responsible for the volume
308
Backup component keeps track of which backup component was sent the data update
310
Backup component accepts data update
312
Backup component mirrors data update to backup component that is responsible for the volume
314
Backup component receives sequence identifier from backup component that is responsible for the volume and keeps track of the sequence identifier and of which backup component was sent the data update
316

FIG. 3A

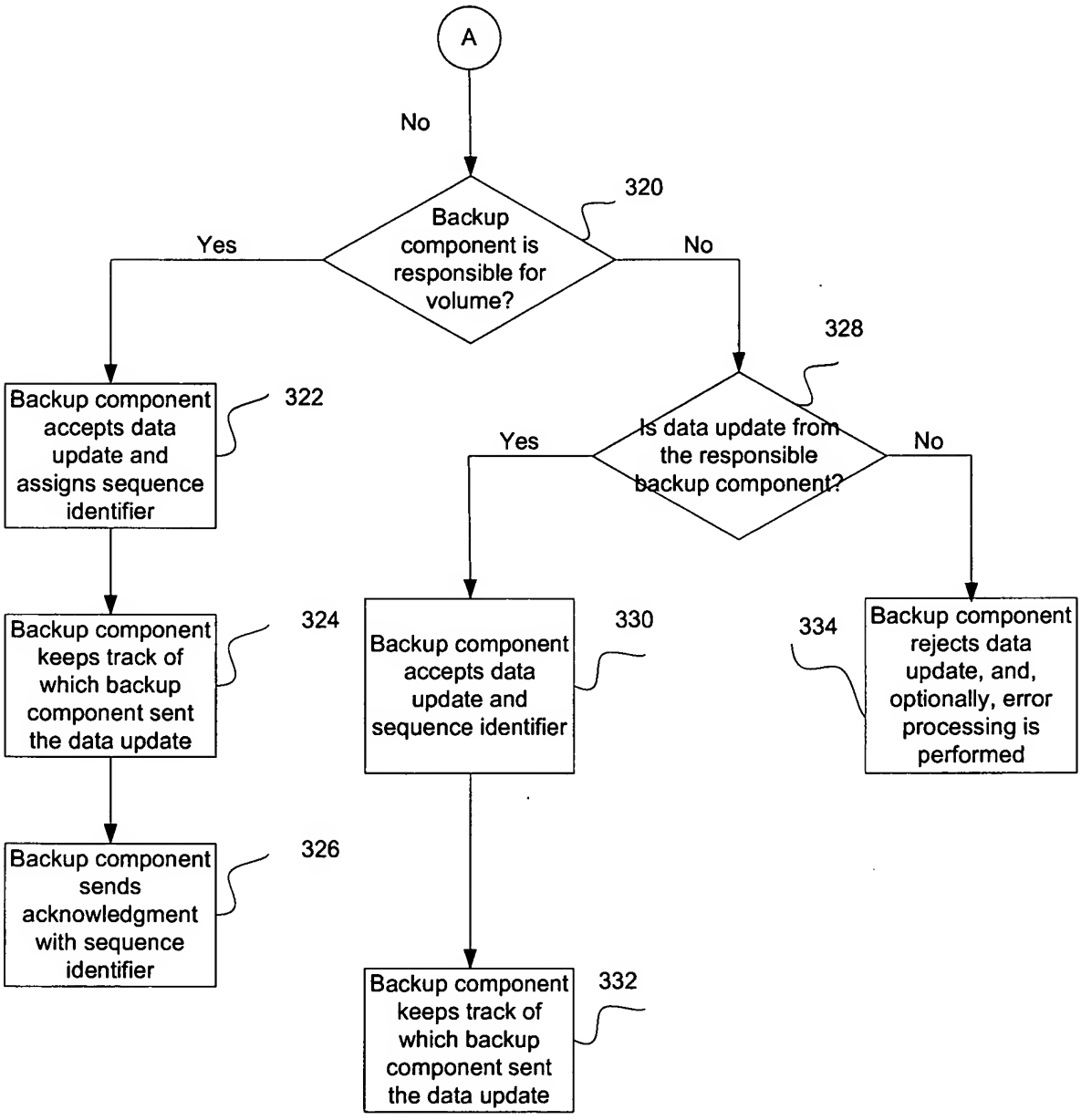
A
No
320
Backup component is responsible for volume?
Yes
No
328
Is data update from the responsible backup component?
Yes
No
Backup component accepts data update and assigns sequence identifier
322
Backup component keeps track of which backup component sent the data update
324
Backup component sends acknowledgment with sequence identifier
326
Backup component accepts data update and sequence identifier
330
Backup component keeps track of which backup component sent the data update
332
Backup component rejects data update, and, optionally, error processing is performed
334

FIG. 3B

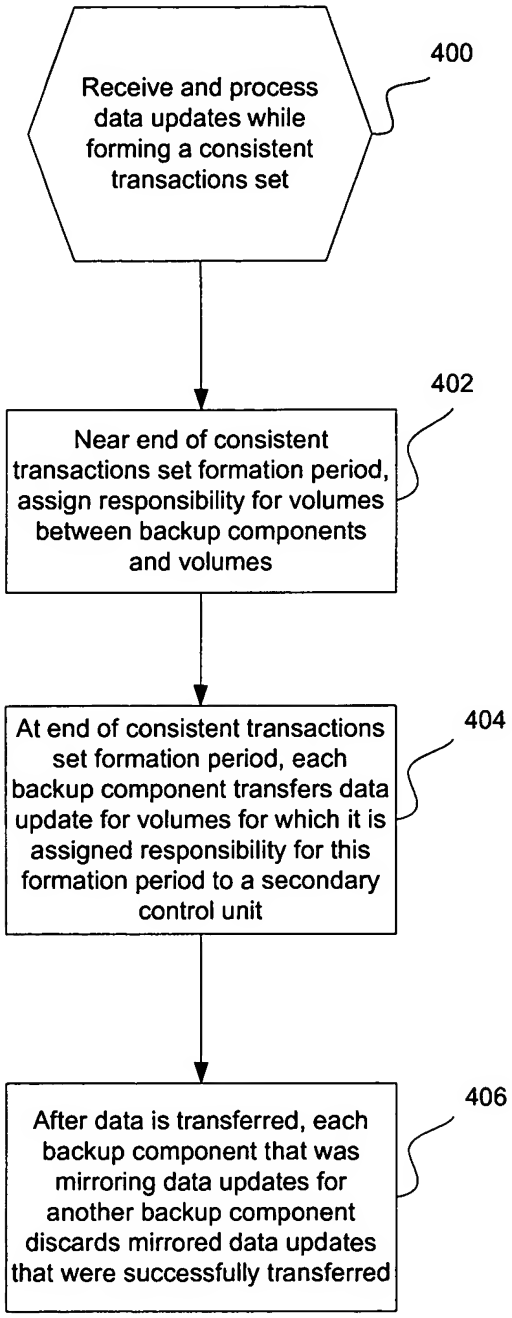
Receive and process data updates while forming a consistent transactions set
400
Near end of consistent transactions set formation period, assign responsibility for volumes between backup components and volumes
402
At end of consistent transactions set formation period, each backup component transfers data update for volumes for which it is assigned responsibility for this formation period to a secondary control unit
404
After data is transferred, each backup component that was mirroring data updates for another backup component discards mirrored data updates that were successfully transferred
406

FIG. 4

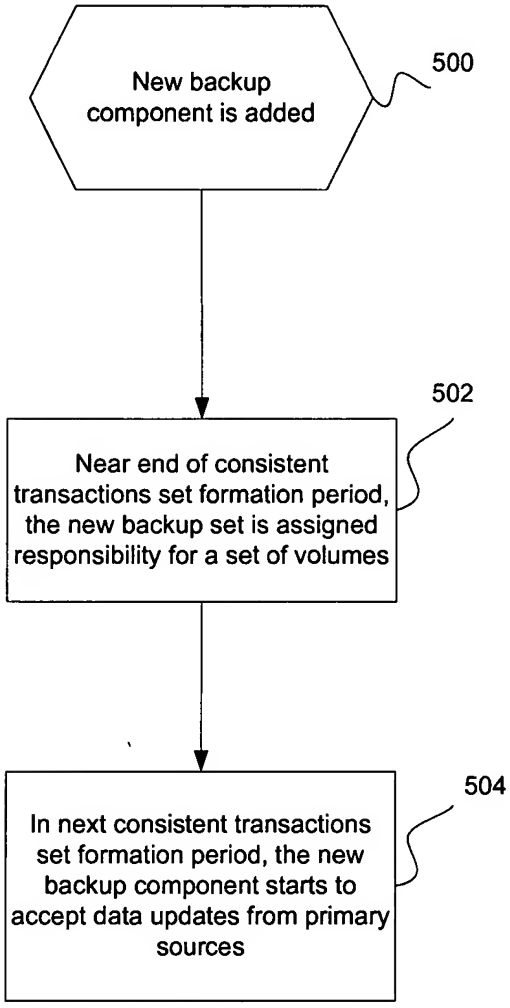
New backup component is added
500
Near end of consistent transactions set formation period, the new backup set is assigned responsibility for a set of volumes
502
In next consistent transactions set formation period, the new backup component starts to accept data updates from primary sources
504

FIG. 5

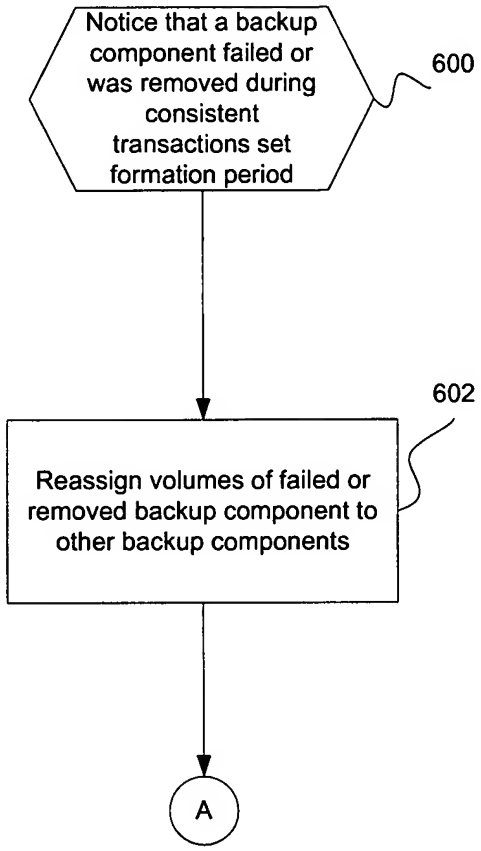
Notice that a backup component failed or was removed during consistent transactions set formation period
600
602
Reassign volumes of failed or removed backup component to other backup components
A

FIG. 6A

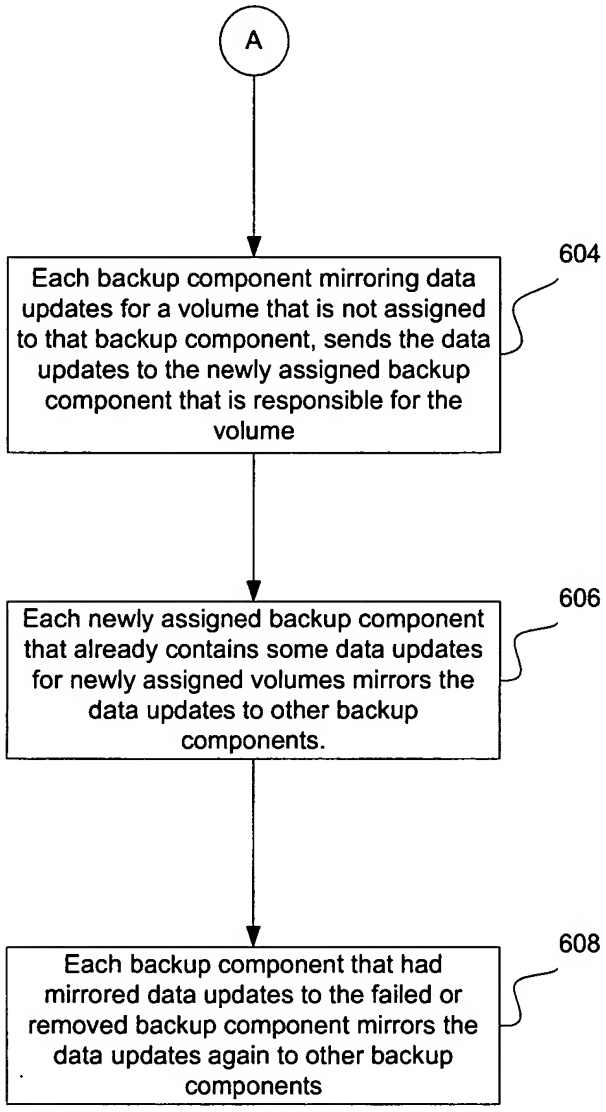
A
Each backup component mirroring data updates for a volume that is not assigned to that backup component, sends the data updates to the newly assigned backup component that is responsible for the volume
604
Each newly assigned backup component that already contains some data updates for newly assigned volumes mirrors the data updates to other backup components.
606
Each backup component that had mirrored data updates to the failed or removed backup component mirrors the data updates again to other backup components
608

FIG. 6B

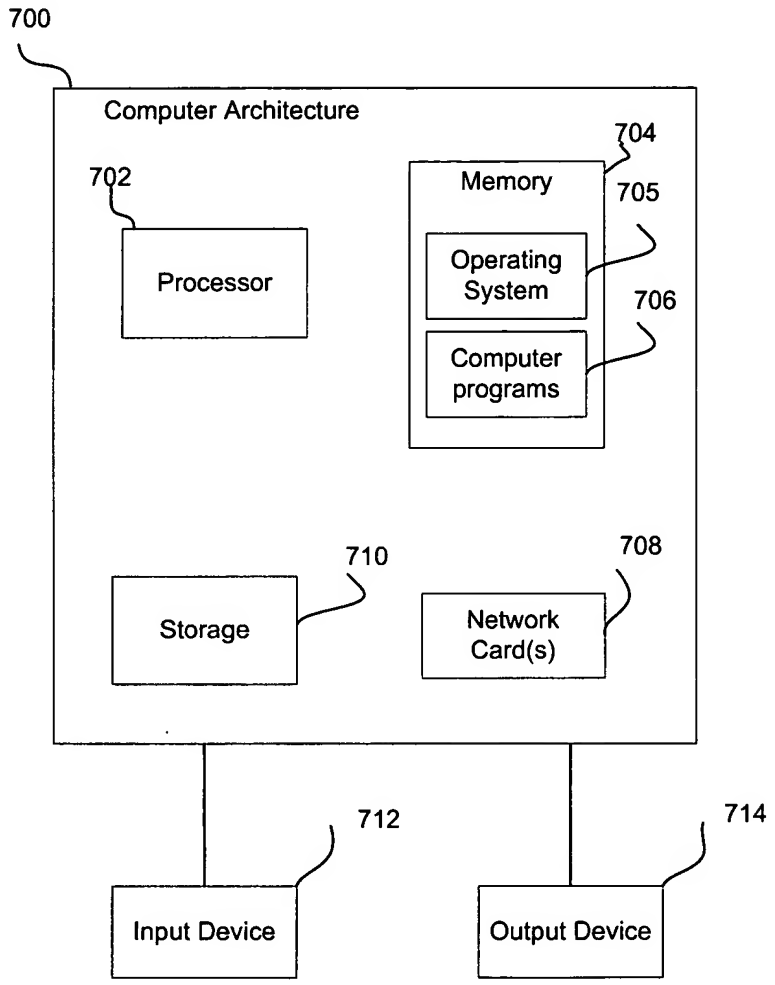
700
Computer Architecture
704
702
Memory
705
Processor
Operating System
706
Computer programs
710
708
Storage
Network Card(s)
712
714
Input Device
Output Device

FIG. 7